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Protocol for a scoping review study to identify occupational health hazards among healthcare providers and ancillary staff in Ghana

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Protocol for a scoping review study to identify occupational health hazards among healthcare providers and ancillary staff in Ghana

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Keywords

Ancillary staff; developing country, Ghana; health personnel; occupational exposure.

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Abstract

Introduction: The formation, modification and implementation of occupational health and safety policy for the Ghana health care industry hinges on data and reviews on occupational exposures. However, there is no synthesized review to speak to the issues of these occupational exposures. A scoping review on occupational exposures among the health workforce in Ghana will provide a broad overview of exposures, and can guide and assist in making decisions on occupational health issues relating healthcare workers.

Methods: The Arksey and O'Malley's scoping review methodology framework will guide the conduct of this scoping review. Primary research studies, government documents and other information on occupational exposures among healthcare workers published in English language will be retrieved from databases, including PubMed, CINAHL, Embase, Medline, Scopus, PsycINFO and Google scholar. Also, grey literature sources in Ghana including government and tertiary institutions websites will be searched. Reference list of key studies will also be screened to identify relevant studies for inclusion. The review will consider studies that address prevalence, knowledge and predisposing factors of occupational exposures along with utilization of occupational hazards preventive measures. After initial removal of duplicates, title and abstract screening, relevant articles will be subjected to full text analysis. The screening processes will be conducted independently by two reviewers. Data will then be extracted and presented in tabular form with a narrative to aid easy comprehension.

Ethics and dissemination: This scoping review sought to identify predominant occupational exposures among healthcare providers and ancillary workers as described in published and unpublished literature. In addressing the increase of occupational exposures among healthcare workforce in Ghana, this scoping review is intended to bring all the literature together and predict the areas of occupational exposures that needs attention and redress. The findings of the study will be disseminated through publications, conference presentations and stakeholder meetings.

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Strengths and limitations of this study

- This study will be the first scoping review to synthesize occupational exposures among the healthcare workforce in Ghana, which will provide a good basis for the modification of existing policy and guidelines.
- Also, this review mainly considers imperative areas such as prevalence, knowledge and predisposing factors of occupational exposures, which are directly linked to the reduction of occupational exposures.
- Apart from using a broad search strategy to search through seven electronic databases, an extensive range of grey literature including unpublished thesis and dissertations on the topic will be used for this study.
- Though the study is projected to provide a good overview of occupational exposures existing in the Ghana healthcare industry, the articles for inclusion will not be subjected to quality assessment.

Introduction

The health care industry is considered as one of the industries that presents the most unsafe occupational settings, placing healthcare providers and ancillary staff at risk of exposure to numerous forms of biological and non-biological hazards. (1–3). These hazards endanger the safety, wellbeing, and ultimately, the life of the healthcare professional. The recent ongoing COVID-19 pandemic reveals the vulnerability of health personnel and health care system (4).

Even though, the key attention of research and safety programmes among healthcare providers are infectious agents such as hepatitis B, Human Immunodeficiency Virus (HIV), influenza and tuberculosis (5), healthcare professionals are also prone to hazards arising from chemicals such as ethylene oxide, formaldehyde, antineoplastic drugs, latex, cleaning and disinfecting agents, which have been associated with cancers, adverse procreative outcomes and asthma (6–10). Also, musculoskeletal disorders and injuries, psychosocial hazards; burnout, stress and violence are experienced at the work environment (11–13).

Whereas these exposures have been recognized in both developed and developing countries, safety and precautionary measures and standards have been implemented in high-income countries to safeguard healthcare providers and mitigate the occurrence of these occupational

exposures (14); however, in low-middle-income countries, including Ghana, occupational and safety issues are mostly neglected (15,16).

The shortfall of occupational health in these developing countries is often blamed on inadequate resources, poor data collection systems, weak enforcement of safety regulations, poor implementation of policies and political commitment (17). Yet, the rise of occupational health hazards among healthcare professionals can partly be attributed to their inconsistencies in practicing the universal safety precautions, comprising of handwashing, wearing of gloves and use of personal protective equipment (PPE) (18).

In Ghana, the subject of occupational health and safety among healthcare providers is not different from other developing countries. According to an occupational health and safety policy guidelines developed for the health sector in Ghana, as at 2010, the Ghana Health Service (GHS) was not in the position to describe the incidence of diseases and exposures among its staff due to the fact that there was no system to gather and compile information on hospital attendance, illness and occupational exposures suffered by its employees (16). Also, the policy echoes that healthcare providers are not only exposed to occupational exposures but are also not sensitized on occupational health and safety issues. Hence, the need of a scoping review to map out the situation of occupational health exposures among the Ghanaian health sector.

An initial search was conducted in MEDLINE, the Cochrane Database of Systematic Reviews and JBI Evidence Synthesis and found no underway scoping review on occupational exposures among healthcare providers and ancillary in Ghana. However, few scoping reviews have been conducted on the subject of occupational exposures in developed and developing countries, none has been conducted in Ghana. A recent scoping review done by Rai et.al, addressed exposures to both biological and non-biological occupational hazards among health workers in low-middle-income countries (19). Additionally, a systematic review conducted by Mossburg et. al. and Auta et. al mainly looked at exposure to blood and blood borne pathogen among healthcare professionals in sub-Saharan Africa (20,21). All these review studies described above mostly considered primary studies on healthcare providers and not ancillary workers in the healthcare industry. Meanwhile, ancillary staff may be more exposed than healthcare providers.

This proposed scoping review to be done in Ghana will apart from healthcare providers (doctors, nurses, laboratory workers, midwives), will consider ancillary staff (waste handlers,

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laundry and kitchen staff), which have been missing in many scoping reviews. Also, this review will specifically consider issues of preventive measures to occupational exposures such as vaccination, compliance to infection prevention control, use of personal protective equipment among others. The knowledge level on occupational exposures will also be described in this review. Additionally, risk factors that are responsible for these exposures such lack working experience, working in multiple facilities and others will be explored.

Limiting this scoping review to Ghana is imperative because there is absolutely lack of data on occupational exposures among healthcare personnel (16) and the situation in other low-middle-income countries may be similar but not the same in the context of Ghana. Since scoping reviews consider unpublished studies, it will provide a good platform to synthesize all these studies and provide good evidence for the modification of the existing policy, which has been in implementation over a decade.

In the space of growing literature on the subject (19), and many of these studies remain unpublished. Therefore, it is imperative to develop country specific scoping reviews on occasional basis to measure strengths and limitations. Scoping reviews, as defined by Arksey and O'Malley are conducted to map out fundamental concepts underlining a research subject, it does so by identifying types, main sources of existing evidence. And can be conducted as a stand-alone research to synthesize evidence to inform policy on a research area (22).

This scoping review centred on Ghana will assess exposures to occupational health hazards among healthcare providers and ancillary staff. Again, it will address knowledge gaps, utilization of precautionary measures, and predisposing factors of occupational health hazards. The review is set to provide a comprehensive overview on occupational exposures in the Ghana health sector, and is aiming to inform and shape the existing occupational health and safety guidelines of the sector.

Study rationale

The menace of occupational exposure to healthcare providers and ancillary staff in developing countries is worst compared to its developed countries counterparts. In the request to reduce these exposures, Ghana, a developing country have developed a policy and guidelines of occupational health and safety for the healthcare industry workforce. However, the policy, in its introduction emphasis on the non-existence of systems to collate data on occupational

exposures in the healthcare sector. After more than a decade since the inception of the policy, a scoping review will be necessary to describe the prevalence, knowledge and predisposing factors as well as the preventive measures of occupational health hazards among healthcare personnel. Yet, there is no synthesis of evidence on the exposure to occupational health hazards among personnel of the healthcare sector. Hence, the conduct of this scoping review. The finding of this review will be very significant in projecting the way forward on the topic of occupational exposures, and also in terms of the modification of the existing policy.

Study objectives

The fundamental objective of this scoping review is to summarize the type and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana. The study will also describe knowledge on occupational health hazards among healthcare providers and ancillary staff, predisposing factors responsible for the exposure to occupational health hazards and finally, utilization of occupational health hazards preventive measures among healthcare providers and ancillary staff. Finally, these pieces of information will be synthesized to identify areas that needs more consideration and focus on the front of working in the healthcare sector of Ghana.

Methods and analysis

Protocol design

Arskey and O'Malley's (22) methodology framework and Levac et al. (23) methodology enhancement formed the basis for the development for this study's methods. Regarding this framework, six stages are involved in conducting a scoping review: 1) identifying the research question; 2) identifying relevant studies; 3) selecting studies; 4) charting the data; 5) collating, summarising and reporting of findings and 6) consulting with relevant stakeholders.

Stage 1: Identifying the research question

The main research question of this review is defined as: 'What are types and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana?'. This fundamental question was developed by the research team in consultation with the key stakeholders in the healthcare industry of Ghana. Through the consultations, some specific questions were developed in addition to the main research question: 1) What is the

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level of knowledge on occupational health hazards? 2) What are the predisposing factors responsible for the exposure to occupational health hazards? 3) What is the level of utilization of occupational health hazards preventive measures?

Stage 2: Identifying relevant studies

The search strategy will aim to locate both published and unpublished studies. An initial limited search of PUBMED AND MEDLINE was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for Embase, CINAHL, PsycINFO, PUBMED, MEDLINE, Scopus and Google Scholar (The proposed search strategy is shown in online supplementary Appendix I). The reference list of all included sources of evidence will be hand screened for additional studies.

To guarantee that all relevant literature is included, sources of unpublished studies and other grey literature will be searched on the websites of health stakeholders and universities in Ghana. These will be done to identify theses/dissertations, reports, conference abstracts for this review.

The search terms for the search strategy will be developed with inputs from research teams, key stakeholders and knowledge users. An experienced librarian and co-author (PAT) will develop the search strategy; however, it will be subjected to revision pending inputs from other stakeholders. The final search strategy will be blinded to all stakeholders.

The final search terms will be utilized as keywords in the title, abstract and subject headings such as MeSH. The search strategy, including all identified keywords and index terms, will be adapted for each included database and other information source. No date limits will be applied to the results of our search; nonetheless, only studies conducted in English language will be considered. Potentially relevant sources will be retrieved in full and their citation details imported into the Rayyan QCRI for the Unified Management, Assessment and Review of Information (24), a web-based and mobile app application that is specifically created for systematic and scoping reviews of articles.

Stage 3: Study selection

Prior to study selection stage, Zotero reference management software (25) will be used to remove all duplicates of exported articles. The review procedure will involve two levels of screening: 1) a title and abstract and 2) full-text review processes. Two independent investigators will conduct the initial screening of title and abstract of all articles using a set of

minimum inclusion and exclusion criteria. In order to ensure that our minimum inclusion and exclusion criteria are robust enough to capture any articles on occupational exposures among healthcare personnel in Ghana, they will be tested on a sample of abstract before the actual review of article abstracts. Any article that is judged as relevant by one or both reviewers will be selected and subjected to the full-text review. The next stage, review of the articles' full-text will be done by the two investigators independently based on the inclusion and exclusion criteria. Also, Cohen's κ statistic will be computed at both the title and abstract as well as the full-text review stages to ascertain inter-rater agreement. In case full-text review results in any discordant articles, the article will be subjected to a second review and further discrepancies about its eligibility will be discussed with a third investigator until the investigators arrived at full consensus. Studies on healthcare providers, specifically, doctors, nurses, laboratory staff, midwives as well as health students among the stated category of workers. Also, it includes studies on ancillary staff such as waste handlers, laundry workers and kitchen staff. The review will consider occupational exposures to biological and non-biological hazards found in the health care environment. All studies on participants not working in a health care facility like hospital and clinics will be excluded. Again, studies on exposures to these pathogenic agents; hepatitis B virus, Human Immunodeficiency Virus (HIV), influenza, tuberculosis and novel coronavirus will be considered. Exposures to other non-biological hazards including chemicals, musculoskeletal disorders and injuries, psychosocial hazards; burnout, stress and violence. The review will consider studies within the confines of Ghana, a developing country in Africa. Finally, this scoping review will consider analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies.

Stage 4: Data collection

A data collection tool will be created by the research group. This will be used to confirm appropriateness of study and serve as a guide to extract study characteristics. The data extracted will include, but not limited to specific details such as year of publication, study design, participants' characteristics, concept of study, context or setting of the study, study methods and key findings relevant to the review question/s. A draft extraction form is provided (see Appendix II). The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included evidence source. Two reviewers will independently conduct the extraction of the data from all the included data. Afterwards, the extracted data from the two independent reviewers will be compared and any differences

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between them will be discussed further to ensure consistency and accuracy of the data. Data validation and coding will be ensured by compiling all extracted data in a single Microsoft excel spreadsheet.

Stage 5: Data summary and synthesis of results

One of the reasons for a scoping review is to map out the concept that underpins a particular research area including the types of evidence available and the main sources of the evidence. The collective findings of this scoping review are to provide an overview of occupational health hazards exposure among healthcare providers and ancillary staff in Ghana, rather than the assessment of the individual studies in the review. This overview will include the prevalence of these exposures, utilization of preventive measures and identified risk factors of exposure to occupational health hazards. The data tabular form; however, graphical or diagrammatic presentation may be used where appropriate. A narrative summary will accompany the tabulated and/or charted results and will describe how the results relate to the reviews objective and questions.

Stage 6: Consultation

According to Levac’s et al. (23), consultation provides the platform for stakeholders to be involved in the scoping review process, they specifically provides information and insights outside what is usually reported in the literature. To address the reality of these exposures in the healthcare facilities in Ghana, stakeholders such as the Ghana Health Service as well as some of its employees will be engaged throughout the conduct of this review, to serve as knowledge users and participants of these exposures. Also, in developing the search strategy and identification of grey literature, these stakeholders will be consulted.

Patient and public involvement

No patient involved.

Dissemination and Ethics

The study is geared towards providing an overview of occupational health hazards among healthcare provider and ancillary staff in Ghana. Again, it is aimed at providing relevant inputs in the modification of the existing occupational health and safety policy and guidelines for the health sector in Ghana. Therefore, the findings of the study will be shared among key

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3 stakeholders like the Ghana Health Service and Ministry of Health. It will also be made public
4 to the Universities who are into the training of public health, occupational and environmental
5 health specialists. The study will also be published in peer-reviewed journal, presented at
6 conferences and stakeholders meetings. Due to the fact that the methodology of scoping
7 reviews involving collection and reviewing of already available materials in the public space,
8 the study does not require ethical approval. However, this study will involve a consultative
9 approach of key stakeholders that will at the end guide the research objectives and facilitates
10 the knowledge transition and translation process.
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20 **Contributors** PAT and EAB conceived of the idea, developed the research question and study
21 methods and contributed meaningfully to the drafting and editing. They also approved the final
22 manuscript. ABA and EAG aided in the developing the research question and study methods,
23 contributed meaningfully to the drafting and editing, and approved the final manuscript.
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Appendix I: Search strategy

A search conducted in PubMed on October 4, 2021.

Table 1: Preliminary search

SEARCH	QUERY	RECORDS RETRIEVED
#1	"Health Personnel"[MeSH Terms] OR "health care workers"[All Fields] OR "health professionals"[All Fields] OR "nurse*"[All Fields] OR "healthcare workforce"[All Fields] OR "doctors"[All Fields] OR "laboratory workers"[All Fields] OR "midwives"[All Fields] OR "students"[All Fields] OR "kitchen staff"[All Fields] OR (("canteen"[All Fields] OR "canteens"[All Fields]) AND ("occupational groups"[MeSH Terms] OR ("occupational"[All Fields] AND "groups"[All Fields]) OR "occupational groups"[All Fields] OR "worker"[All Fields] OR "workers"[All Fields] OR "worker s"[All Fields])) OR "laundry workers"[All Fields] OR "Waste handlers"[All Fields] OR "clean*"[All Fields]	1,311,477
#2	"Occupational Exposure"[MeSH Terms] OR "occupational hazards"[All Fields] OR "occupational risks"[All Fields] OR "occupational diseases"[All Fields] OR "occupational injuries"[All Fields] OR "occupational accidents"[All Fields] OR "occupational stress"[All Fields] OR "sharp injuries"[All Fields] OR "needle pricks"[All Fields] OR "Cuts"[All Fields] OR "wounds"[All Fields] OR "airborne diseases"[All Fields] OR "infectious diseases"[All Fields] OR "physical abuse"[All Fields] OR "sexual abuse"[All Fields] OR "verbal abuse"[All Fields] OR "musculoskeletal injuries"[All Fields] OR "slips"[All Fields] OR "trips"[All Fields] OR "falls"[All Fields] OR "chemical spill"[All Fields] OR "fractures"[All Fields] OR "noise"[All Fields] OR "burns"[All Fields] OR "radiations"[All Fields] OR "burnout"[All Fields]	1,250,476
#3	"Ghana"[MeSH Terms] OR ("Ghana"[MeSH Terms] OR "Ghana"[All Fields] OR ("republic"[All Fields] AND "Ghana"[All Fields]) OR "republic of ghana"[All Fields]) OR "ghana*"[Title/Abstract]	19,506
#4	#1 AND #2 AND #3	151
Limitations to search		
1. Language: Only studies published in English language will be included.		
2. Publication date: All studies from the inception of the database.		

Appendix II: Data extraction instrument

This review extraction instrument will be composed of two sections;

1. General background information of studies

Table 1: General information

General information
Author and date
Title of study
Aim of study
Study setting
Study design/study population
Sample size/sampling method
Methodology/instrument
Outcomes/key findings
Limitations/gaps/directions

2. Key questions posed by the review will also be tabulated as follows:

Table 2: Review considerations

Review considerations
Author and date
Category of health personnel
Type of exposure
Risk of exposure
Knowledge on exposures/preventive measures
Predisposing factors of exposures
Utilization of universal precautions

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Identifying occupational health hazards among healthcare providers and ancillary staff in Ghana: a scoping review protocol

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Primary Subject Heading:	Public health
Secondary Subject Heading:	Public health, Occupational and environmental medicine, Health policy
Keywords:	Health & safety < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Protocols & guidelines < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Risk management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Infectious disease/HIV < NEUROLOGY, Musculoskeletal disorders < ORTHOPAEDIC & TRAUMA SURGERY, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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Identifying occupational health hazards among healthcare providers and ancillary staff in Ghana: a scoping review protocol

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Keywords

Ancillary staff; developing country, Ghana; health personnel; occupational exposure.

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Identifying occupational health hazards among healthcare providers and ancillary staff in Ghana: a scoping review protocol

Abstract

Introduction The formation, modification and implementation of occupational health and safety policy for the Ghana health care industry hinge on data and reviews on occupational exposures. However, there is no synthesized review to speak to the issues of these occupational exposures. A scoping review on occupational exposures among the health workforce in Ghana will provide a broad overview of exposures, and can guide and assist in making decisions on occupational health issues relating to healthcare workers.

Methods and analysis Arksey and O'Malley's scoping review methodology framework will guide the conduct of this scoping review. Primary research studies, government documents and other information on occupational exposures among healthcare workers published in the English language will be retrieved from databases including PubMed, CINAHL, Embase, Medline, Scopus, PsycINFO and Google scholar. A systematic search strategy will be employed to identify articles from 1 January 2010 until 30 November 2021. Also, grey literature sources in Ghana including government and tertiary institutions websites will be searched. A reference list of key studies and other available non-electronic materials will also be screened to identify relevant studies for inclusion. The review will consider studies that address prevalence, knowledge and predisposing factors of occupational exposures along with the use of occupational hazards control/preventive measures. After removal of duplicates, and title and abstract screening, relevant articles will be subjected to full-text analysis. The screening processes will be conducted independently by two reviewers. Data will then be extracted and presented in tabular form with a narrative to aid easy comprehension.

Ethics and dissemination This scoping review does not require ethical approval. The findings will be disseminated through publications, conference presentations and stakeholder meetings.

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Strengths and limitations of this study

- This present scoping review will use Preferred Items for Systematic reviews and Meta-analyses extension for Scoping Reviews (PRISMA-ScR) guidelines when reporting the findings.
- A consultative approach was used in developing the research questions and search terms for this protocol.
- Seven (7) electronic databases, grey literature, specifically unpublished thesis and dissertations will be used as main sources of relevant studies.
- Two (2) independent investigators will conduct the screening of all articles using a set of minimum inclusion and exclusion criteria.
- The articles included in this review will not be subjected to quality assessment.

Introduction

The health care sector is considered as one of the industries that present the most unsafe occupational settings, placing healthcare providers and ancillary staff at risk of exposure to numerous forms of biological and non-biological hazards (1–3). These hazards endanger the safety, wellbeing, and ultimately the life of the healthcare professional. The recent ongoing COVID-19 pandemic reveals the vulnerability of health personnel and the health care system (4).

Even though the key attention of research and safety programmes among healthcare providers are infectious agents such as hepatitis B, Human Immunodeficiency Virus (HIV), influenza and tuberculosis (5), healthcare professionals are also prone to hazards arising from chemicals such as ethylene oxide, formaldehyde, antineoplastic drugs, latex, cleaning and disinfecting agents, which have been associated with cancers, adverse procreative outcomes and asthma (6–10). Also, musculoskeletal disorders and injuries, psychosocial hazards; burnout, stress and violence are experienced in the work environment (11–13).

Whereas these exposures have been recognized in both developed and developing countries, safety and precautionary measures and standards have been implemented in high-income countries to safeguard healthcare providers and mitigate the occurrence of these occupational exposures (14); however, in low-middle-income countries, including Ghana, occupational and safety issues are mostly neglected (15,16).

The shortfall of occupational health in these developing countries is often blamed on inadequate resources, poor data collection systems, weak enforcement of safety regulations, poor implementation of policies and political commitment (17). Yet, the rise of occupational health hazards among healthcare professionals can partly be attributed to their inconsistencies in practising the universal safety precautions; handwashing, wearing of gloves and use of other personal protective equipment (PPE) (18).

In Ghana, the subject of occupational health and safety among healthcare providers is not different from other developing countries. According to occupational health and safety policy guidelines developed for the health sector in Ghana, as of 2010, the Ghana Health Service (GHS) was not in the position to describe the incidence of diseases and exposures among its staff since there was no system to gather and compile information on hospital attendance, illness and occupational exposures suffered by its employees (16). Also, the policy emphasized that healthcare providers are not only exposed to occupational exposures but are also not sensitized to occupational health and safety issues. Hence, the need for a scoping review to map out the situation of occupational health exposures among the Ghanaian health sector.

An initial search conducted in MEDLINE, the Cochrane Database of Systematic Reviews and JBI Evidence Synthesis found no underway scoping review on occupational exposures among healthcare providers and ancillary in Ghana. However, few scoping reviews have been conducted on the subject of occupational exposures in developed and developing countries. A recent scoping review done by Rai et al. addressed exposures to both biological and non-biological occupational hazards among health workers in low-middle-income countries (19). Additionally, a systematic review conducted by Mossburg et al. and Auta et al. mainly looked at exposure to blood and bloodborne pathogen among healthcare professionals in sub-Saharan Africa (20,21). All these reviews described above and many other similar reviews mostly considered primary studies on healthcare providers and ancillary workers in the healthcare industry. Nonetheless, primary studies that had only ancillary staff (workers in the elementary occupations category of the WHO health worker classification) as study participants were not seen in those reviews. Meanwhile, this group of workers may be more exposed than healthcare providers (staff in the health professional and health associate professional of the WHO health worker classification).

This proposed scoping review will consider studies on healthcare providers (doctors, nurses, laboratory workers, midwives and other health professional and health associate professionals)

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as well as those that have only ancillary staff (waste handlers, laundry, kitchen staff and other elementary occupation workers) or general health workers as its study participants, which have been missing in many scoping reviews. Again, this review will specifically consider issues of preventive measures to occupational exposures such as vaccination, compliance to infection prevention control, use of personal protective equipment and control/preventive measures. The knowledge level on occupational exposures among the healthcare workforce will also be described in this review. Additionally, risk factors that are responsible for these exposures such as lack of working experience, working in multiple facilities and others will be explored.

Limiting this scoping review to Ghana is imperative because there is an absolute lack of data on occupational exposures among healthcare personnel (16) and the situation in other low-middle-income countries may be similar but not the same in the context of Ghana. Since scoping reviews consider unpublished studies, it will provide a good platform to synthesize all these studies and provide good evidence for the modification of the existing policy, which had been in implementation for over a decade.

In the space of growing literature on the subject (19), many of these studies remain unpublished. Therefore, it is imperative to develop country-specific scoping reviews on an occasional basis, where unpublished and available non-electronic literature is considered. Scoping reviews, as defined by Arksey and O'Malley are conducted to map out fundamental concepts underlining a research subject, it does so by identifying types and main sources of existing evidence. And can be conducted as stand-alone research to synthesize evidence to inform policy on a research area (22). In this present work, scoping review was chosen over systematic review because the review sought to identify the kind of evidence available on this topic and subsequently, analyse the gaps in the knowledge domain. However, the authors hope to use this review as a precursor to systematic reviews on specific areas of this topic.

This scoping review centred on Ghana will assess exposures to occupational health hazards among healthcare providers and ancillary staff. Again, it will address knowledge gaps, utilization of control/preventive measures, and predisposing factors of occupational health hazards. This review is being conducted to provide a comprehensive overview of occupational exposures in the Ghana health sector and is aimed at informing and shaping the existing occupational health and safety guidelines of the sector.

Study rationale

The menace of occupational exposure to healthcare providers and ancillary staff in developing countries is worst compared to its developed countries counterparts. In the quest to reduce these exposures, Ghana, a developing country had developed a policy and guidelines of occupational health and safety for the healthcare industry (16). However, the policy in its introduction emphasized the non-existence of systems to collate data on occupational exposures in the healthcare sector. After more than a decade since the inception of the policy, a scoping review will be necessary to describe the prevalence, knowledge and predisposing factors as well as the control/preventive measures of occupational health hazards among health workers. Yet, there is no synthesis of evidence on the exposure to occupational health hazards among personnel of the healthcare sector. Hence, the conduct of this scoping review. The findings of this review will be very significant in projecting the way forward on the topic of occupational exposures and also in terms of the modification of the existing policy.

Study objectives

The fundamental objective of this scoping review is to summarize the type and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana. The study will also describe knowledge on occupational health hazards among healthcare providers and ancillary staff, predisposing factors responsible for the exposure to occupational health hazards and utilization of occupational health hazards control/preventive measures. Finally, these pieces of information will be synthesized to identify areas that need more consideration.

Methods and analysis

Protocol design

Arskey and O'Malley's (22) methodology framework and Levac et al. (23) methodology enhancement formed the basis for the development of this protocol. Concerning this framework, six stages are involved in conducting a scoping review: 1) identifying the research question, 2) identifying relevant studies, 3) selecting studies, 4) charting the data, 5) collating, summarising and reporting of findings and 6) consulting with relevant stakeholders.

Stage 1: Identifying the research question

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The main research question of this review is defined as: ‘What are the types and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana?’. This fundamental question was developed by the research team in consultation with some stakeholders in the healthcare industry of Ghana comprising workers in health care facilities and academicians in the field of occupational health. Through the consultations, some specific questions were developed in addition to the main research question: 1) What is the level of knowledge relating to the risk of exposure and control/preventive measures of occupational health hazards among health care workers? 2) What are the predisposing factors responsible for the exposure to occupational health hazards? 3) What are the available control/preventive measures for the health workers to use? and 4) What is the level of utilization of these control/preventive measures?

Stage 2: Identifying relevant studies

A search strategy will be aimed at locating both published and unpublished studies. An initial limited search of PUBMED AND MEDLINE was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for Embase, CINAHL, PsycINFO, PUBMED, MEDLINE, Scopus and Google Scholar (The proposed search strategy is shown in online supplementary Appendix I). This systematic search strategy will be used to identify articles from 1 January 2010 until 30 November 2021. Inclusion will be limited to studies published in the English Language. The reference list of all included sources of evidence and other non-electronic materials will be hand-screened for additional studies.

To guarantee that all relevant literature is included, sources of unpublished studies and other grey literature will be searched on the websites of health stakeholders and universities in Ghana. This will be done to identify theses/dissertations, reports and conference abstracts.

The search terms for the search strategy were developed with inputs from research teams, key stakeholders and knowledge users such as health care professionals, and university faculty members in the area of occupational health. An experienced librarian and co-author (PAT) developed the initial search strategy; however, it will be subjected to revision pending inputs from other stakeholders. The final search strategy will be blinded to all stakeholders to prevent bias in the selection of articles that may have been published by these scholars or health care professionals.

Stage 3: Study selection

The study selection will be based on a set of inclusion and exclusion criteria. Inclusion criteria: 1) studies on healthcare providers, healthcare students, ancillary staff or general health workers, 2) studies on occupational exposures to biological and non-biological hazards, 3) studies conducted in health care facilities in Ghana and 4) studies based on prospective and retrospective cohort, case-control, cross-sectional study designs. Exclusion criteria: 1) studies on participants not working in health care facilities.

Before the study selection stage, Zotero reference management software (24) will be used to remove all duplicates of exported articles. Potentially relevant sources will be retrieved in full and their citation details imported into the Rayyan QCRI for Unified Management, Assessment and Review of Information (25), a web-based and mobile app application that is specifically created for systematic and scoping reviews of articles.

The review procedure will involve two levels of screening: 1) a title and abstract and 2) full-text review processes. Two independent investigators will conduct the initial screening of the title and abstract of all articles using a set of minimum inclusion and exclusion criteria. To ensure that our minimum inclusion and exclusion criteria are robust enough to capture any articles on occupational exposures among healthcare personnel in Ghana, they will be tested on a sample of abstracts before the actual review of article abstracts. Any article that is judged as relevant by one or both reviewers will be selected and subjected to a full-text review. In the next stage, a review of the articles' full-text will be done by the two investigators independently based on the inclusion and exclusion criteria. In case full-text review results in any discordant articles, the article will be subjected to a second review and further discrepancies about its eligibility will be discussed with a third investigator until the investigators arrived at a full consensus.

Stage 4: Data extraction

A data collection tool will be created by the research group. This will be used to confirm the appropriateness of the study and serve as a guide to extract study characteristics. The data extracted will include, but is not limited to specific details such as year of publication, study design, participants' characteristics, the concept of the study, context or setting of the study, study methods and key findings relevant to the review question/s. A draft extraction form is provided (see Appendix II). The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included evidence source. Two

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reviewers will independently conduct the extraction of the data from all the included data. Afterwards, the extracted data from the two independent reviewers will be compared and any differences between them will be discussed further to ensure consistency and accuracy of the data. Data validation and coding will be ensured by compiling all extracted data in a single Microsoft Excel spreadsheet.

Stage 5: Data summary and synthesis of results

One of the reasons for a scoping review is to map out the concept that underpins a particular research area including the types of evidence available and the main sources of the evidence. The findings of this scoping review are to provide an overview of occupational health hazards exposure among healthcare providers and ancillary staff in Ghana, rather than the assessment of the individual studies in the review and these findings will be reported according to the PRISMA-ScR guidelines. The overview will include the prevalence of exposures, utilization of control/preventive measures and identified risk factors of exposure to occupational health hazards. The data tabular form will be used; however, a graphical or diagrammatic presentation may be used where appropriate. A narrative summary will accompany the tabulated and/or charted results.

Stage 6: Consultation

According to Levac’s et al. (23), consultation provides the platform for stakeholders to be involved in the scoping review process. They specifically provide information and insights outside what is usually reported in the literature. To address the reality of these exposures in the healthcare facilities in Ghana, stakeholders such as key employees of Ghana Health Service will be engaged throughout the conduct of this review through interviews. These employees also serve as knowledge users and victims of these exposures. Also, in developing the search strategy and identification of grey literature, these stakeholders will be consulted.

Patient and public involvement

No patient was involved.

Ethics and Dissemination

The study is geared towards providing an overview of occupational health hazards among healthcare providers and ancillary staff in Ghana. Again, it is aimed at providing relevant inputs

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3 in the modification of the existing occupational health and safety policy and guidelines for the
4 health sector in Ghana. Therefore, the findings of the study will be shared among key
5 stakeholders like the Ghana Health Service and Ministry of Health. It will also be made public
6 to the Universities that are into the training of public health, occupational and environmental
7 health specialists. The study will also be published in a peer-reviewed journal, presented at
8 conferences and stakeholders meetings. Since the methodology of scoping reviews involves
9 the collection and reviewing of already available materials in the public space, the study does
10 not require ethical approval. However, this study will involve a consultative approach of key
11 stakeholders that will guide the research objectives and facilitate the knowledge transition and
12 translation process.
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23 **Contributors** PAT and EAB conceived of the idea, developed the research question and study
24 methods and contributed meaningfully to the drafting and editing. They also approved the final
25 manuscript. ABA and EAG aided in developing the research question and study methods and
26 contributed meaningfully to the drafting and editing and approved the final manuscript.
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38 **Data sharing statement** No additional data are available.
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Appendix I: Search strategy

Table 1: Final Search Strategy

THEME	NUMBER	SEARCH TERMS
Concept	#1	"Occupational Exposure" OR "occupational hazards" OR "occupational risks" OR "occupational diseases" OR "occupational injuries" OR "occupational accidents" OR "occupational stress" OR "sharp injuries" OR "needle pricks" OR "Cuts" OR "wounds" OR "airborne diseases" OR "infectious diseases" OR "physical abuse" OR "sexual abuse" OR "verbal abuse" OR "musculoskeletal injuries" OR "slips" OR "trips" OR "falls" OR "chemical spill" OR "fractures" OR "noise" OR "burns" OR "radiations" OR "burnout"
Participants	#2	"Health Personnel" OR "health care workers" OR "health professionals" OR nurse* OR "healthcare workforce" OR "doctors" OR "laboratory workers" OR "midwives" OR "students" OR "kitchen staff" OR canteen workers OR "laundry workers" OR "Waste handlers" OR clean*
Context	#3	"Ghana" OR Republic of Ghana OR Ghana*
Search	#4	#1 AND #2 AND #3
Limitations		<div>1. Language: Only studies published in English language will be included.</div> <div>2. Publication date: 1 January 2010 to 30 November 2021.</div>

Appendix II: Data extraction instrument

This review extraction instrument will be composed of two sections;

1. General background information of studies

Table 1: General information

General information
Author and date
Title of study
Aim of study
Study setting
Study design/study population
Sample size/sampling method
Methodology/instrument
Outcomes/key findings
Limitations/gaps/directions

2. Key questions posed by the review will also be tabulated as follows:

Table 2: Review considerations

Review considerations
Author and date
Category of health personnel
Type of exposure
Risk of exposure
Knowledge on exposures/preventive measures
Predisposing factors of exposures
Use of control/preventative measure

BMJ Open

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Manuscript ID	bmjopen-2021-058048.R2
Article Type:	Protocol
Date Submitted by the Author:	17-Dec-2021
Complete List of Authors:	Tawiah, Philip; Kwame Nkrumah University of Science and Technology, School of Public Health, College of Health Sciences; University of Health and Allied Sciences, School of Pharmacy Baffour-Awuah, Alberta; Kwame Nkrumah University of Science and Technology, School of Public Health, College of Health Sciences Appiah-Brempong, Emmanuel; Kwame Nkrumah University of Science and Technology, Department of Health Promotion and Disability Studies Afriyie-Gyawu, Evans; Kwame Nkrumah University of Science and Technology, School of Public Health, College of Health Sciences
Primary Subject Heading:	Public health
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Abstract

Introduction The formation, modification and implementation of occupational health and safety policy for the Ghana health care industry hinge on data and reviews on occupational exposures. However, there is no synthesized review to speak to the issues of these occupational exposures. A scoping review on occupational exposures among the health workforce in Ghana will provide a broad overview of exposures, and can guide and assist in making decisions on occupational health issues relating to healthcare workers.

Methods and analysis Arksey and O'Malley's scoping review methodology framework will guide the conduct of this scoping review. Primary research studies, government documents and other information on occupational exposures among healthcare workers published in the English language will be retrieved from databases including PubMed, CINAHL, Embase, Medline, Scopus, PsycINFO and Google scholar. A systematic search strategy will be employed to identify articles from 1 January 2010 until 30 November 2021. Also, grey literature sources in Ghana including government and tertiary institutions websites will be searched. A reference list of key studies and other available non-electronic materials will also be screened to identify relevant studies for inclusion. The review will consider studies that address prevalence, knowledge and predisposing factors of occupational exposures along with the use of occupational hazards control/preventive measures. After removal of duplicates, and title and abstract screening, relevant articles will be subjected to full-text analysis. The screening processes will be conducted independently by two reviewers. Data will then be extracted and presented in tabular form with a narrative to aid easy comprehension.

Ethics and dissemination This scoping review does not require ethical approval. The findings will be disseminated through publications, conference presentations and stakeholder meetings.

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Strengths and limitations of this study

- This present scoping review will use Preferred Items for Systematic reviews and Meta-analyses extension for Scoping Reviews (PRISMA-ScR) guidelines when reporting the findings.
- A consultative approach was used in developing the research questions and search terms for this protocol.
- Seven (7) electronic databases, grey literature; specifically unpublished thesis and dissertations will be used as main sources of relevant studies.
- Two (2) independent investigators will conduct the screening of all articles using a set of minimum inclusion and exclusion criteria.
- The articles included in this review will not be subjected to quality assessment.

Introduction

The health care sector is considered as one of the industries that present the most unsafe occupational settings, placing healthcare providers and ancillary staff at risk of exposure to numerous forms of biological and non-biological hazards (1–3). These hazards endanger the safety, wellbeing, and ultimately the life of the healthcare professional. The recent ongoing COVID-19 pandemic reveals the vulnerability of health personnel and the health care system (4).

Even though the key attention of research and safety programmes among healthcare providers are infectious agents such as hepatitis B, Human Immunodeficiency Virus (HIV), influenza and tuberculosis (5), healthcare professionals are also prone to hazards arising from chemicals such as ethylene oxide, formaldehyde, antineoplastic drugs, latex, cleaning and disinfecting agents, which have been associated with cancers, adverse procreative outcomes and asthma (6–10). Also, musculoskeletal disorders and injuries, psychosocial hazards; burnout, stress and violence are experienced in the work environment (11–13).

Whereas these exposures have been recognized in both developed and developing countries, safety and precautionary measures and standards have been implemented in high-income countries to safeguard healthcare providers and mitigate the occurrence of these occupational exposures (14); however, in low-middle-income countries including Ghana, occupational and safety issues are mostly neglected (15,16).

The shortfall of occupational health in these developing countries is often blamed on inadequate resources, poor data collection systems, weak enforcement of safety regulations, poor implementation of policies and political commitment (17). Yet, the rise of occupational health hazards among healthcare professionals can partly be attributed to their inconsistencies in practising the universal safety precautions; handwashing, wearing of gloves and use of other personal protective equipment (PPE) (18).

In Ghana, the subject of occupational health and safety among healthcare providers is not different from other developing countries. According to occupational health and safety policy guidelines developed for the health sector in Ghana, as of 2010, the Ghana Health Service (GHS) was not in the position to describe the incidence of diseases and exposures among its staff since there was no system to gather and compile information on hospital attendance, illness and occupational exposures suffered by its employees (16). Also, the policy emphasized that healthcare providers are not only exposed to occupational exposures but are also not sensitized to occupational health and safety issues. Hence, the need for a scoping review to map out the situation of occupational health exposures among the Ghanaian health sector.

An initial search conducted in MEDLINE, the Cochrane Database of Systematic Reviews and JBI Evidence Synthesis found no underway scoping review on occupational exposures among healthcare providers and ancillary in Ghana. However, few scoping reviews have been conducted on the subject of occupational exposures in developed and developing countries. A recent scoping review done by Rai et al. addressed exposures to both biological and non-biological occupational hazards among health workers in low-middle-income countries (19). Additionally, a systematic review conducted by Mossburg et al. and Auta et al. mainly looked at exposure to blood and bloodborne pathogen among healthcare professionals in sub-Saharan Africa (20,21). All these reviews described above and many other similar reviews mostly considered primary studies on healthcare providers and ancillary workers in the healthcare industry. Nonetheless, primary studies that had only ancillary staff (workers in the elementary occupations category of the WHO health worker classification) as study participants were not seen in those reviews. Meanwhile, this group of workers may be more exposed than healthcare providers (staff in the health professional and health associate professional of the WHO health worker classification).

This proposed scoping review will consider studies on healthcare providers (doctors, nurses, laboratory workers, midwives and other health professional and health associate professionals)

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as well as those that have only ancillary staff (waste handlers, laundry, kitchen staff and other elementary occupation workers) or general health workers as its study participants, which have been missing in many scoping reviews. Again, this review will specifically consider issues of preventive measures to occupational exposures such as vaccination, compliance to infection prevention control, use of personal protective equipment and control/preventive measures. The knowledge level on occupational exposures among the healthcare workforce will also be described in this review. Additionally, risk factors that are responsible for these exposures such as lack of working experience, working in multiple facilities and others will be explored.

Limiting this scoping review to Ghana is imperative because there is an absolute lack of data on occupational exposures among healthcare personnel (16) and the situation in other low-middle-income countries may be similar but not the same in the context of Ghana. Since scoping reviews consider unpublished studies, it will provide a good platform to synthesize all these studies and provide good evidence for the modification of the existing policy, which had been in implementation for over a decade.

In the space of growing literature on the subject (19), many of these studies remain unpublished. Therefore, it is imperative to develop country-specific scoping reviews on an occasional basis, where unpublished and available non-electronic literature is considered. Scoping reviews, as defined by Arksey and O'Malley are conducted to map out fundamental concepts underlining a research subject, it does so by identifying types and main sources of existing evidence. And can be conducted as stand-alone research to synthesize evidence to inform policy on a research area (22). In this present work, scoping review was chosen over systematic review because the review sought to identify the kind of evidence available on this topic and subsequently, analyse the gaps in the knowledge domain. However, the authors hope to use this review as a precursor to systematic reviews on specific areas of this topic.

This scoping review centred on Ghana will assess exposures to occupational health hazards among healthcare providers and ancillary staff. Again, it will address knowledge gaps, utilization of control/preventive measures, and predisposing factors of occupational health hazards. This review is being conducted to provide a comprehensive overview of occupational exposures in the Ghana health sector and is aimed at informing and shaping the existing occupational health and safety guidelines of the sector.

Study rationale

The menace of occupational exposure to healthcare providers and ancillary staff in developing countries is worst compared to its developed countries counterparts. In the quest to reduce these exposures, Ghana, a developing country had developed a policy and guidelines of occupational health and safety for the healthcare industry (16). However, the policy in its introduction emphasized the non-existence of systems to collate data on occupational exposures in the healthcare sector. After more than a decade since the inception of the policy, a scoping review will be necessary to describe the prevalence, knowledge and predisposing factors as well as the control/preventive measures of occupational health hazards among health workers. Yet, there is no synthesis of evidence on the exposure to occupational health hazards among personnel of the healthcare sector. Hence, the conduct of this scoping review. The findings of this review will be very significant in projecting the way forward on the topic of occupational exposures and also in terms of the modification of the existing policy.

Study objectives

The fundamental objective of this scoping review is to summarize the type and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana. The study will also describe knowledge on occupational health hazards among healthcare providers and ancillary staff, predisposing factors responsible for the exposure to occupational health hazards and utilization of occupational health hazards control/preventive measures. Finally, these pieces of information will be synthesized to identify areas that need more consideration.

Methods and analysis

Protocol design

Arskey and O'Malley's (22) methodology framework and Levac et al. (23) methodology enhancement formed the basis for the development of this protocol. Concerning this framework, six stages are involved in conducting a scoping review: 1) identifying the research question, 2) identifying relevant studies, 3) selecting studies, 4) charting the data, 5) collating, summarising and reporting of findings and 6) consulting with relevant stakeholders.

Stage 1: Identifying the research question

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The main research question of this review is defined as: ‘What are the types and prevalence of exposure to occupational health hazards among healthcare providers and ancillary staff in Ghana?’. This fundamental question was developed by the research team in consultation with some stakeholders in the healthcare industry of Ghana comprising workers in health care facilities and academicians in the field of occupational health. Through the consultations, some specific questions were developed in addition to the main research question: 1) What is the level of knowledge relating to the risk of exposure and control/preventive measures of occupational health hazards among health care workers? 2) What are the predisposing factors responsible for the exposure to occupational health hazards? 3) What are the available control/preventive measures for the health workers to use? and 4) What is the level of utilization of these control/preventive measures?

Stage 2: Identifying relevant studies

A search strategy will be aimed at locating both published and unpublished studies. An initial limited search of PUBMED AND MEDLINE was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for Embase, CINAHL, PsycINFO, PUBMED, MEDLINE, Scopus and Google Scholar (The proposed search strategy is shown in online supplementary Appendix I). This systematic search strategy will be used to identify articles from 1 January 2010 until 30 November 2021. Inclusion will be limited to studies published in the English Language. The reference list of all included sources of evidence and other non-electronic materials will be hand-screened for additional studies.

To guarantee that all relevant literature is included, sources of unpublished studies and other grey literature will be searched on the websites of health stakeholders and universities in Ghana. This will be done to identify theses/dissertations, reports and conference abstracts.

The search terms for the search strategy were developed with inputs from research teams, key stakeholders and knowledge users such as health care professionals, and university faculty members in the area of occupational health. An experienced librarian and co-author (PAT) developed the initial search strategy; however, it will be subjected to revision pending inputs from other stakeholders. The final search strategy will be blinded to all stakeholders to prevent bias in the selection of articles that may have been published by these scholars or health care professionals.

Stage 3: Study selection

The study selection will be based on a set of inclusion and exclusion criteria. Inclusion criteria: 1) studies on healthcare providers, healthcare students, ancillary staff or general health workers, 2) studies on occupational exposures to biological and non-biological hazards, 3) studies conducted in health care facilities in Ghana and 4) studies based on prospective and retrospective cohort, case-control, cross-sectional study designs. Exclusion criteria: 1) studies on participants not working in health care facilities and 2) qualitative studies.

Before the study selection stage, Zotero reference management software (24) will be used to remove all duplicates of exported articles. Potentially relevant sources will be retrieved in full and their citation details imported into the Rayyan QCRI for Unified Management, Assessment and Review of Information (25), a web-based and mobile app application that is specifically created for systematic and scoping reviews of articles.

The review procedure will involve two levels of screening: 1) a title and abstract and 2) full-text review processes. Two independent investigators will conduct the initial screening of the title and abstract of all articles using a set of minimum inclusion and exclusion criteria. To ensure that our minimum inclusion and exclusion criteria are robust enough to capture any articles on occupational exposures among healthcare personnel in Ghana, they will be tested on a sample of abstracts before the actual review of article abstracts. Any article that is judged as relevant by one or both reviewers will be selected and subjected to a full-text review. In the next stage, a review of the articles' full-text will be done by the two investigators independently based on the inclusion and exclusion criteria. In case full-text review results in any discordant articles, the article will be subjected to a second review and further discrepancies about its eligibility will be discussed with a third investigator until the investigators arrived at a full consensus.

Stage 4: Data extraction

A data collection tool will be created by the research group. This will be used to confirm the appropriateness of the study and serve as a guide to extract study characteristics. The data extracted will include, but is not limited to specific details such as year of publication, study design, participants' characteristics, the concept of the study, context or setting of the study, study methods and key findings relevant to the review question/s. A draft extraction form is provided (see Appendix II). The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included evidence source. Two

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reviewers will independently conduct the extraction of the data from all the included data. Afterwards, the extracted data from the two independent reviewers will be compared and any differences between them will be discussed further to ensure consistency and accuracy of the data. Data validation and coding will be ensured by compiling all extracted data in a single Microsoft Excel spreadsheet.

Stage 5: Data summary and synthesis of results

One of the reasons for a scoping review is to map out the concept that underpins a particular research area including the types of evidence available and the main sources of the evidence. The findings of this scoping review are to provide an overview of occupational health hazards exposure among healthcare providers and ancillary staff in Ghana, rather than the assessment of the individual studies in the review and these findings will be reported according to the PRISMA-ScR guidelines. The overview will include the prevalence of exposures, utilization of control/preventive measures and identified risk factors of exposure to occupational health hazards. The data tabular form will be used; however, a graphical or diagrammatic presentation may be used where appropriate. A narrative summary will accompany the tabulated and/or charted results.

Stage 6: Consultation

According to Levac’s et al. (23), consultation provides the platform for stakeholders to be involved in the scoping review process. They specifically provide information and insights outside what is usually reported in the literature. To address the reality of these exposures in the healthcare facilities in Ghana, stakeholders such as key employees of Ghana Health Service will be engaged throughout the conduct of this review through interviews. These employees also serve as knowledge users and victims of these exposures. Also, in developing the search strategy and identification of grey literature, these stakeholders will be consulted.

Patient and public involvement

No patient was involved.

Ethics and Dissemination

The study is geared towards providing an overview of occupational health hazards among healthcare providers and ancillary staff in Ghana. Again, it is aimed at providing relevant inputs

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3 in the modification of the existing occupational health and safety policy and guidelines for the
4 health sector in Ghana. Therefore, the findings of the study will be shared among key
5 stakeholders like the Ghana Health Service and Ministry of Health. It will also be made public
6 to the Universities that are into the training of public health, occupational and environmental
7 health specialists. The study will also be published in a peer-reviewed journal, presented at
8 conferences and stakeholders meetings. Since the methodology of scoping reviews involves
9 the collection and reviewing of already available materials in the public space, the study does
10 not require ethical approval. However, this study will involve a consultative approach of key
11 stakeholders that will guide the research objectives and facilitate the knowledge transition and
12 translation process.
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23 **Contributors** PAT and EAB conceived of the idea, developed the research question and study
24 methods and contributed meaningfully to the drafting and editing. They also approved the final
25 manuscript. ABA and EAG aided in developing the research question and study methods and
26 contributed meaningfully to the drafting and editing and approved the final manuscript.
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35 **Provenance and peer review** Not commissioned, externally peer-reviewed
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38 **Data sharing statement** No additional data are available.
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Appendix I: Search strategy

Table 1: Final Search Strategy

THEME	NUMBER	SEARCH TERMS
Concept	#1	"Occupational Exposure" OR "occupational hazards" OR "occupational risks" OR "occupational diseases" OR "occupational injuries" OR "occupational accidents" OR "occupational stress" OR "sharp injuries" OR "needle pricks" OR "Cuts" OR "wounds" OR "airborne diseases" OR "infectious diseases" OR "physical abuse" OR "sexual abuse" OR "verbal abuse" OR "musculoskeletal injuries" OR "slips" OR "trips" OR "falls" OR "chemical spill" OR "fractures" OR "noise" OR "burns" OR "radiations" OR "burnout"
Participants	#2	"Health Personnel" OR "health care workers" OR "health professionals" OR nurse* OR "healthcare workforce" OR "doctors" OR "laboratory workers" OR "midwives" OR "students" OR "kitchen staff" OR canteen workers OR "laundry workers" OR "Waste handlers" OR clean*
Context	#3	"Ghana" OR Republic of Ghana OR Ghana*
Search	#4	#1 AND #2 AND #3
Limitations		<div>1. Language: Only studies published in English language will be included.</div> <div>2. Publication date: 1 January 2010 to 30 November 2021.</div>

Appendix II: Data extraction instrument

This review extraction instrument will be composed of two sections;

1. General background information of studies

Table 1: General information

General information
Author and date
Title of study
Aim of study
Study setting
Study design/study population
Sample size/sampling method
Methodology/instrument
Outcomes/key findings
Limitations/gaps/directions

2. Key questions posed by the review will also be tabulated as follows:

Table 2: Review considerations

Review considerations
Author and date
Category of health personnel
Type of exposure
Prevalence of exposure
Knowledge on exposures/preventive measures
Predisposing factors of exposures
Use of control/preventative measures